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## EDITORIAL

### THE SKIN AS A FUNCTIONAL ORGAN OF THE BODY<sup>1</sup>

Early in the 19th century, the skin came to be regarded as a physiological organ of the body. Its four principal functions were known from classical antiquity; but physicians did not begin to act upon this assumption until latterly. The cell theory, as elaborated by Virchow, with reference to pathological formations, was the starting point of modern reasoning about the skin. Virchow, a champion of democracy within the Prussian state, conceived of the body as a kind of political organization of highly differentiated citizen-cells, some, as in the heart, or lungs, carrying on the scheme of division of labor as skilled employees in a closed industrial area or unit; others, such as neoplasms, constituting anti-social, non-industrial groups, subsisting as parasites at the expense of the social body; others, like cancer, being lawless, anarchistic elements, running counter to social welfare, and sometimes proliferating to the extent of destroying the whole social organization. Democracy, in one well-known view, is not so much a form of government as a mode of education of the people for future social and political adjustments. Government, whether of a hamlet, a city or a vast area like the United States or Russia, is not a matter of differentiation, as in the cell state, but of integration or balance of centrifugal and centripetal social forces, of debit

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<sup>1</sup>Lecture read in the Institute of the History of Medicine, Welch Medical Library, Baltimore, Maryland, on April 12, 1933.

and credit, of community welfare and independence, of the altruistic and self-regarding motives. Even the financing or feeding of an army, a city or a nation is a matter of integration, since either tyranny or anarchy in such relations may spell chaos. Beaconsfield observed that where social solidarity and cooperation are very strong, government, as such, may be unobtrusive to the vanishing point; where the social order is weak, in other words, centrifugal and heterodox, strong government is necessary. Bismarck adapted himself to the *panta rhei* view of things and inscribed upon his seal ring *unda fert nec regitur*. There is no better example of the theory that the best government governs least than the human or animal body. So well balanced and integrated are its different physiologic units, circulatory, digestive, respiratory, nervous, endocrine, that we are not even aware of their existence until they get out of order. The function of the body, as a closed physico-chemical system, is to maintain a certain constant balance of all these units with reference to one another and to the external world. An automatic balance of this kind constitutes health; imbalance disease. The immense groups of citizen-cells, each of them with an intense, individualistic life of its own, constitute the locus, in each case, of balance or imbalance within each unit or among the several units with reference to the whole organism. Nevertheless, the significance of the skin as a physiologic organ of the body, as an analogue of the heart, the lungs or the nervous system, is best understood by considering, for a moment, the individual cell.

In the beginning was protoplasm, without form and void, a structureless colloid mass, neither alive nor dead, but chemically active, and tending to concentrate at a "center of oxidation", through the establishment of chemical equilibrium between the periphery of the colloid and the investing medium. If this mass were floating in sea water, then the surface of discontinuity between the rim of the protoplasm and the investing saline medium would be the locus of formation of a new chemical substance at the interface and according to the thermodynamic laws gov-

erning the formation of liquid films, the only stable substance which could be so evolved would be the one having the least relative surface tension. It is only when the colloid acquires this limiting, semi-permeable envelope or cell-membrane, that it can be regarded as alive, in the sense of acquiring, shall we say, by act of God, the physiological functions of nutrition, metabolism and reproduction. It is only when the center of oxidation becomes similarly invested that it can function as the cell nucleus and carry on cell division. It is through the existence of this peripheral, semi-permeable envelope that a mass of nucleated or oxidating protoplasm, an organ or an organism becomes vitalized, for even blood-serum, milk, chyle, the pleural, pericardial, peritoneal, synovial and cerebrospinal fluids are physiologically dead, albeit chemically active, or more accurately, passive. In the infant, the skin weighs one-fifth of the body, in the adult 18 per cent. The epidermis weighs a pound. In the larger creatures, such as the crocodile, the tiger or the python, this protective envelope becomes extraordinarily thick and tough, merging even into the hard carapace of the turtle or such appendages of the skin as claws, hoofs, horns, tusks, nails, hair and wool, which only begin to be alive at their proximal extremities<sup>2</sup>. Nothing animate or inanimate, from a protoplasmic cell to jacketed steam, can function, in the sense of doing work through proper channels, without an investing envelope, which is an analogue of the protective mechanisms of a nation with reference to the *propter invidiam* of other nations. In the view of Lord Kelvin, the living organism functions, not as a thermodynamic engine, but like an electric motor energized by a voltaic battery. In the view of Sir Oliver Lodge, the function of life, vitality or the "vital principal" is not to generate this energy, but to guide it into proper channels, as the steam in the engine is canalized to do work. Only a small amount of the free energy generated is available to do this work, and but for

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<sup>2</sup>See, the interesting contribution of A. F. A. King, "What is a living animal? How much of it is alive?" in *Popular Science Monthly*, N. Y., 1909, LXXV, 289-296.

the limiting envelope, the total energy, say in the boiler, would be dissipated into space. So, too, an animal flayed of its hide, let alone a human being, would not last long. In ancient Rome, statues of Apollo flaying Marsyas stood in front of the Forum and other courts of justice, to symbolize the omnipotence of the law in inflicting punishment. Whether it would be possible to remove such a thin, fragile, sensitive envelope as the human skin, except inch-meal, is dubious, but if so, the attitude of the victim in his death agony would not be passive but more probably like that of cadavers of people burned to death in conflagrations, the *attitude de combat* of the medico-legal experts. Physicists have found that the human skin, as an insulator to prevent this dissipation of vital energy, has an electrical resistance between 1000 and 6000 ohms. That of a horse's hoof is 4,700,000,000 ohms, that of a green pea ten million ohms, that of a grain of wheat between two million and ten trillion ohms<sup>3</sup>. Apart from microorganisms, the human skin is therefore the most sensitive and frangible of all integuments or protective envelopes in animals and plants.

These facts may serve to illustrate the extreme importance of the skin as a functional organ of the body. In the light of Galen's view that "structure follows function", the limiting envelope, say of a primordial cell, came into being through a physico-chemical determinism or necessity. In Haller's day, physiology became "animated anatomy", or structure in the act of functioning, but it took years to arrive at our present view of pathology as an alteration or deflection of physiologic function. What has hindered progress has been the confusion of the functioning structure itself with the physiologic determinism which created it and keeps it going in definite channels. As Huxley observed, the cells "are no more the producers of the vital phenomena than the shells scattered along the sea beach are the instruments by which the gravitative force of the moon acts upon the ocean. Like these,

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<sup>3</sup>King: *op. cit.*, 292-294.

the cells mark only where the vital tides have been and how they acted." It is comparatively easy to visualize how life may have arisen from a colloid accidentally charged with electricity and how it keeps going by what Hering called the "facultative memory" of protoplasm, the power to go on doing what it learned to do in the first remote instance; but just why all this came to pass we shall never know.

Human concern as to the individuality, vitality and integrity of the skin is evidenced in innumerable by-words and literary expressions from the earliest times. That "beauty is only skin deep" is suggested at once by the cosmetic episodes on Greek vases, the multifarious touting of cold creams and cosmetics in current magazines or the various allusions to somebody's "stale skin" in recent novels. Lecky opined that, in the general run of humanity, this cutaneous phase of facial comeliness is largely a matter of color and texture, while the aristocratic profile is an affair of bony conformation. In Richardson's *Clarissa Harlowe* (1748), we read: "Her features are so regular that were she only skin and bone, she must be a beauty;" and in *Middlemarch* (I, 9): "He looks like a death's head skinned over for the occasion." Huxley even made color of skin the criterion of race ("Race is pigmentation"), albeit the cranial characteristics of the three fundamental ethnic groups are vividly outlined in bas-relief on the Egyptian tomb of Seti. That a man is as old as his skin, as well as his arteries, is a very old physiologic observation<sup>4</sup>. Kipling's trite pronouncement that women are the same thing under their skins may be set off by the more scientific observation of Persius (III, 30): *Ego te intus et in cute novi*,

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<sup>4</sup>Retterer (*Compt. rend. Soc. de biol.*, Paris, 1916, LXXIX, 1113-1118) regards the epithelium as a kind of reserve bank of potential energy of the organism, a sort of fountain of youth for the other tissues, as long as it continues to proliferate. In childhood, youth and middle life, the dermal envelope renews itself at the expense of the proliferating epidermal epithelium. In old age, when the epithelium ceases to proliferate, the epidermis dwindles and the skin wrinkles to the point of senile atrophy. The Greek and Latin words for old age and for the skin sloughed off by a snake are identical.

which is the essence of the physician's approach in diagnosis. The ancient writers, indeed, abound in acute observations on the skin, such as the *facies Hippocratica* or Lucretius (VI, 1193) on the *frigida pellis* of approaching death; or Horace on the well-groomed appearance of those who take proper care of their persons:

"Me pinguem et nitidem bene curata cute visis," I, Epist., IV, 15.

or of the fop:

"In cute curanda plus aequo operata juvenus," I, Epist., II, 29.

or the plebian hide of the churlish rough-neck:

"Quae se commendat tonsa cute dentibus atris," I, Epist., XVIII, 7.

or the whited sepulchre sometimes implicit in a comely exterior:

"Introrsum turpem, speciosum pelle decora," I, Epist., XVI, 45.

In the daily personal hygiene of the Greeks and Romans, oiling of the skin, the use of the strigil or skin-scraper and the practice of depilation by professionals, were routine features.

Such expressions of the English people as thick and thin skinned, to be in one's skin, to be in a bad skin (bad temper), to be fond of one's own skin, to come off with a whole skin, or the impossibility of jumping out of one's skin, go back to the *veterem pelliculam retines* of Persius (V, 116) and the *quiescere in propria pelle* of Martial (V, 60). Horace notes the revelation of character implied in stripping off the facial mask as *detrahare pellem* (II Sat. I, 64). "As honest as the skin between your brows" was a common expression of Shakespeare and the old dramatists to denote how much the skin is an essential element of one's being, indeed, the significance of the skin as an *arrêt irrévocable* of destiny is a commonplace in Jeremiah (XIII, 23): "Can the Ethiopian change his skin or the leopard his spots?" In the tropical and subtropical Orient, any wound or lesion of the skin is a matter of moment or concern, as being hard

to heal. The dubious relation of the skinning over of a wound to perfect healing is implicit in Coleridge's line:

"Short peace shall skin the wounds of causeless war."

Oriental feeling about this matter is plain in the book of Job :

"My skin is broken and become loathsome" (VII, 7).

"Destruction shall be ready at his side and it shall devour the strength of his skin" (XVIII, 12-13).

"My bone cleaveth to my skin and to my flesh and I am escaped with the skin of my teeth" (XIX, 20).

The pathological effects of tropical fever and famine in old age are poignantly conveyed in Job (XXX, 29-30) :

"I am a brother to dragons and a companion to owls;

My skin is black upon me and my bones are burned with heat;"

and in the Lamentations of Jeremiah :

"Our skin was black like an oven from the terrible famine" (V, 10).

"My flesh and my skin he hath made old; he hath broken my bones" (III, 4).

"Their skin cleaveth to their bones; it is withered; it is become like a stick" (IV, 8).

The fifty nine verses of the 13th chapter of Leviticus, on the ritual examination and isolation of lepers and suspects of leprosy, are replete with clinical casuistry based upon appearances of the skin :

"When a man shall have in the skin of his flesh a rising, a scab, or bright spot, and it be in the skin of his flesh like the plague of leprosy; then he shall be brought unto Aaron the priest, or unto one of his sons the priests:

"And the priest shall look on the plague in the skin of the flesh; and when the hair in the plague is turned white, and the plague in sight be deeper than the skin of his flesh, it is a plague of leprosy: and the priest shall look on him, and pronounce him unclean.

"If the bright spot be white in the skin of his flesh, and in sight be not deeper than the skin, and the hair thereof be not turned white: then the priest shall shut up him that hath the plague seven days."

The general concern of humanity about the integrity of the skin is voiced by Satan in the book of Job (II, 4) :

"Skin for skin, yea, all that a man hath will he give for his life;"

as well as in the jolly outburst of the Host in the Merry Wives of Windsor (III, 1) :

"Your hearts are mighty, your skins are whole."

Little was really known about the structure of the skin until the establishment of the cell theory, although observations on the coarser histology, the end organs, the pores and the perspiration had been made in the earlier period by Fabricius ab Aquapendente (1618), Malpighi (1665), Bartholinus (1666), Leuwenhoek (1674), Albinus (1685), Morgagni (1706), Vater (1717), Boerhaave (1738) and J. F. Meckel (1753-7). The rest was done by such promoters of the cell theory as Purkinje (1833), Henle (1840), von Baerensprung (1848), Kölliker (1852), Lister (1852), Meissner (1853), Langerhans (1858-73), Huxley (1859), Bizzozero (1864), Vulpian (1871-9), Friedrich Merkel (1875-81), Unna (1876-1908), Ranvier (1877-80), Krause (1880- ), Flemming (1881-4) and Hebra (1882). There was much writing on the ethnic peculiarities of the skin, particularly in the negro, down to the time of Soemmerring (1785) and even of Flourens (1837). With the cell theory, it came to be known that, in the unicellular organisms and protozoa, the cell membrane is the peripheral agent in nutrition, excretion and the molar phase of reproduction. In man, the tactile, excretory, absorptive and protective functions of the skin were known from the earliest times. Hippocrates and Galen assumed that the skin is permeable to air and the quantitative balance between perspiration, urination and alvine excretion was a matter of daily and seasonal observation. The rôle of the skin in tissue respiration was established by Spallanzani for amphibia (*circa* 1798)<sup>5</sup>; by Lavoisier (1777), Cruikshank (1779-95), Abernethy (1793), Seguin (1814), Aubert and Lange (1872) for man; and by Zuntz, Lehmann and Hagemann for the total skin of a horse (1894). Spallanzani showed that many amphibia take up oxygen and give off CO<sub>2</sub> by

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<sup>5</sup>Spallanzani: *Memorie sulla respirazione*, Milano, 1803 (posthumous publication).



the skin after excision of the lungs and live longer than the same animals whose skin has been varnished. Lavoisier and Cruikshank found that the human skin excretes  $\text{CO}_2$  and Abernethy that it will absorb oxygen and give off  $\text{CO}_2$  as readily in the air as in oxygen. Eventually Pflüger and his pupils (1875-93) established the truth of Spallanzani's discovery that gas-exchange in the tissues is greater than that in the blood. Fatalities in earlier experiments on varnishing the human skin, such as that of the boy gilded as an angel at the coronation of Pope Leo X (1513) are now attributed to some poisonous effects of the varnish. In 1877, Senator showed that the whole surface of the body can remain covered with an impermeable layer for 8-10 days without any untoward effects, while animals with a larger cutaneous surface, with reference to the weight of the body, such as rabbits or horses, eventually die. In like manner, the damage done by extensive burns of the skin is not due to interference with cutaneous respiration and excretion of wastes, but to shock, changes in the blood and disturbance of temperature-regulation by destruction of the nerve-endings. The dependence of perspiration upon the innervation of the skin was discovered by Goltz in 1875 and shown by Ostromov and others to be associated with sudorific fibres in the sympathetic trunk and the spinal cord. The net result of the many experiments with atropine and pilocarpine upon the sweat-glands has been the establishment of the vagotonic and sympathicotonic diatheses and their relation to the sympathetic-autonomic system. That electrical impulses pass inward from the cutaneous glands was discovered by du Bois Reymond and confirmed by Rosenthal (1875). The cutaneous nerve supply for sensations of temperature, pain and pressure was investigated by Goldscheider (1884-5) and Max von Frey (1896). The problem of absorption by the skin occupied investigators during the whole of the 19th century. The difficulties encountered turned upon the varying reactions of the epidermis to different chemical substances, the unpredictable susceptibility or insusceptibility of different animals and different individuals and the fact that epi-

dermic reactions to many substances are negative. The classical instance, that of inunction by mercurials, was known even in the early Middle Ages. The best animal skin for absorption is that of the frog, as being in the nature of a perfect semi-permeable diaphragm. Skin-vision or the capacity of the skin of certain lower organisms to perceive light, has now been found to be true of the human skin with reference to colored light<sup>6</sup>.

The functions of the skin have been neatly summarized by A. J. Hall<sup>7</sup> as follows:

1. The skin is our first line of defense against external injuries, including infection *via* some solution of continuity. 2. It is also the body's outpost for heat regulation; the first tissue to be chilled or overheated by changes in external temperature. 3. It is the Intelligence Headquarters of the central nervous system and the sexual apparatus, being the first to contact with external agencies, good or bad, welcome or unwelcome. 4. Apart from the mucosa, it is the only tissue visible to other eyes, hence a principal medium for attraction, repulsion or evasion by protective mimicry. It is in brief, the universal receptor organ of the body. Where the unbroken cell membrane shoulders nearly all the business of nutrition and elimination, the only function of the skin in relation to the interior of the body is the excretion of water plus certain salts and as a heat regulator with regard to domestic metabolism. The skin is thus a screen or semi-permeable diaphragm between the external world and what is going on inside the body.

Early in the 19th century, as stated, the skin was regarded and referred to as a functional organ of the body; seldom, if ever, in the matter of cutaneous reactions to disease. In disease, the skin is not so much a protective covering as an organ. The more expanded concept is bound up with present knowledge of the relations of the parasympathetic and endocrine systems, the various serologic, allergic and pharmacologic tests, the effects of light, radiation and radium on the skin, its chamæleon-like sensitivity to atmospheric and emotional disturbances, all tending to the recent view that the skin is not so much the outward and visible index of internal disease as a very delicate reacting medium to pathologic stimuli from without and

<sup>6</sup>W. Finkler: *Umschau*, Frankfurt a. M., 1933, XXXVII, 213-215.

<sup>7</sup>A. J. Hall: *Lancet*, London, 1921, I, 426.

within<sup>8</sup>. There is a herpes which is fatal in pregnancy and a psoriasis which coexists with pregnancy, disappears at term and may reappear sometime after the birth of the child. Facts of this order illustrate the extreme lability of the skin with regard to happenings within and without the body.

One of the most interesting aspects of the skin as a reacting diaphragm is that of the application of therapeutic agencies to the surface of the body, of which we have familiar examples in hydrotherapy, with the capillaries as a kind of auxiliary skin-heart, cupping, leeching and venesection, counter-irritation by mustard plasters, the use of liniments, salves, mercurial inunctions, the seton and the moxa, massage and intradermal injections.

About 1793<sup>9</sup>, Edward Jenner began to experiment with tartar emetic, and, confirming the experiences of Thomas Bradley (1773)<sup>10</sup> and John Ferriar (1792-8), found that eruptions produced by external inunction of tartar emetic salves would often abort certain diseases. By 1882, he had eighteen case histories<sup>11</sup>, with evidence of relief in insanity, melancholia, asthma, nervous, respiratory and hepatic disorders and whooping cough, in which Robertson (*London Med. Reposit.*, 1821, XV, 6-12), had got phenomenal results. Jenner reasoned that the drug exanthem

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<sup>8</sup>For the skin as an organ, see, in particular: G. C. E. Sandrock: *De cutis dignitate semeiotica*. Marburg diss. 1831. A. Jesionek: *Biologie der gesunden und kranken Haut*. Leipzig, 1916. A. F. Hecht: *Die Haut als Test-object*. Wien, 1925. J. K. Mayr: *Die Erscheinungen der Haut bei inneren Krankheiten*. Leipzig, 1926. W. Grunow: *Die Haut als Stoffwechselorgan*. Berlin, 1927.

<sup>9</sup>Jenner: *Tr. Soc. Improve. Med. and Chir. Knowledge*, London, 1793, I, 30-33.

<sup>10</sup>Bradley: *Mem. Med. Soc.*, London (1773-86), 1787, I, 247-252.

<sup>11</sup>Jenner: A letter to Charles Henry Parry on the influence of artificial eruptions in certain diseases incident to the human body. 4<sup>o</sup>, London, 1822. From the initial observation of Hippocrates on malaria and paralysis to the time of Coley (erysipelas in sarcoma) and Wagner-Jauregg, the nullification of one disease by another (*De morbis salutiferis*) had arrested the attention of physicians, particularly in the 18th century.

drove out the disease externally, each papule being a messenger of good news, as in small pox, and even proposed the treatment of all diseases by artificial production of skin-eruptions. It is known that vaccination will abort whooping cough and the prophylactic effects of the seton and the moxa were ancient history to the Chinese and the Japanese. The cutaneous aspects of syphilis, tuberculosis, the exanthematous fevers, the visceral neuroses, the gouty-rheumatic and neuro-syphilitic diatheses, and many other diseases, which have reduced the erythematous, purpuric, herpetic and eczematous eruptions to mere symptoms, may be regarded as the peripheral reactions of susceptible individuals to pathologic changes within the body. Allbutt, Charcot, Osler and Libman have shown that the multiform symptoms of certain diatheses, such as the gouty-rheumatic and neuro-syphilitic, may actually pivot in space and time around erythematous and purpuric eruptions by distribution among the ascendants, descendants and collateral sibs of a given family. On the other hand, the treatment of a limited, local cutaneous eruption will sometimes cause it to spread in an embarrassing way, and this is not due, as formerly supposed, to internal causes nor even to the skin itself, but to the reactions of its involuntary nerve supply in susceptible individuals. Idiosyncrasies to the primrose (*Primula obconica*), phenylhydrazin, quinine, and other chemical substances are innumerable and unpredictable. Hall's case of a widespread inflammation from knocking over a vase of roses containing a single primrose shows, in his view, a difference between specific, local, nervous susceptibility and allergy, which affects distant parts. An eruption from a necklace of pearls, was found to be due to a waxy substance within the pearls, affecting a patient found to be highly susceptible to greasy ointments<sup>12</sup>.

The question arises, when does a cutaneous eruption indicate that the skin itself is diseased and when is it a sign of cutaneous activity as an immunizing or excretory agent, driving

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<sup>12</sup>Hall: *op. cit.*

the disease from within outward, as Jenner thought? One of the earliest manifestoes of the former case, the theme of most dermatologists up to recent times, is the curious pseudo-Hippocratic treatise, the *capsula eburnea* or Ivory Capsule, which deals with the prognosis of certain skin eruptions. That the skin itself has diseases all its own, can be powerfully affected by external agencies, from tropical sunlight, which produces a veritable furnace burn, to a pathogenic parasite, is self-evident. In 1918, E. F. Mueller<sup>13</sup> found that intradermal injections of the non-specific protein, aolan, in chronic gonorrhœa will produce remarkable therapeutic effects upon the distant urethral membrane, which cannot be duplicated by subcutaneous, intravenous or intramuscular injections; that a positive Wassermann can be superinduced in old syphilitics with a negative Wassermann by minute subdermal injections of a non-specific protein, and more recently that intradermal injections of insulin or iletin are in like manner, more potent than injections by the subcutaneous route. His conclusion, from later experiments, is that these remote effects are produced by a reaction of the parasympathetic fibres supplying the skin rather than by the particular substance, since a subdermal injection is negative. He reasons that the rôle of the skin in the Dick and Schick and von Pirquet tests, in asthma and idiosyncrasies to food, is that of a reflector of processes deviating from the normal. The toxins of diphtheria and typhus, as well as virulent bacteria, may be detoxicated by macerated bits of skin *in vitro*. The skin has therefore a direct immunizing action, as well as a remote healing action, like that in an intradermal injection of aolan, and this independently of the blood current and the blood cells; for none of these results are obtainable by intravenous injections.

Bruno Bloch, in 1917<sup>14</sup>, produced a gradual and apparently perfect immunity from trichophytiasis by successive cutaneous vaccinations of the fungus. In 1927, he demon-

<sup>13</sup>E. F. Mueller: *Illinois M. J.*, Oak Park, 1925, XLVIII, 358-363.

<sup>14</sup>B. Bloch: *Cor. Bl. f. schweiz. Aerzte*, Basel, 1917, XLVII, 993-1007.

strated facultative susceptibility to *Primula*, and has since been the outstanding investigator of the allergies, anaphylaxes and idiosyncrasies of the skin.

That there is a powerful solidist immunizing property in the skin, apart from the humoral immunity attaching to the blood, may be taken as proved. It was called esophylaxis by Erich Hoffmann in 1919<sup>15</sup>. The assumption of some theorists that the skin possesses a specific internal secretion is best handled, for the present at least, by Occam's razor: *Entia non sunt multiplicanda*, since such extra hypotheses are footless, where a simpler explanation is available. The cutaneous manifestations of myxoedema, Addison's disease, gonadic disorders, pregnancy, puberty and the menopause are provisionally explicable by the relation of the endocrine organs to the sympathetic and parasympathetic nerve fibres. The allergic and endocrine reactions of the skin are legion. In Germany, patients susceptible to dust or allergy are kept in dust-proof, "allergy-free" rooms<sup>16</sup>.

Long ago, Hebra, one of the great masters of his subject, said: "We are at present at our a - b - c's in dermatology and must learn to *read* the skin." Hebra, Da Costa and Joseph Bell, the original of Sherlock Holmes, were, in fact, able to amuse themselves by telling each of their patients, in succession, his occupation and other stray facts about himself, from a rapid survey of his external appearance. This sort of thing, like Corvisart's diagnosis of approaching fatality in heart disease from an oil painting, was an ambition of the period in which physicians had to sharpen their senses in default of instrumentation. Considerable information of an empirical kind has accumulated latterly, in connection with the revival of the doctrine of the constitution with regard to the external appearances of disease or tendency to disease. Cases in point are Kretschmer's studies of the cycloid or manic-depressive and the schizoid or praecox types and Draper's observations on the facial appearance

<sup>15</sup>E. Hoffmann: *Deutsche med. Wochenschr.*, Leipz. and Berl., 1919, XLV, 1233-1236.

<sup>16</sup>A. Stühmer: *Die Haut als vollwertiges Organ*. Münster, 1931, 10.

of pernicious anaemics and victims of peptic ulcer. The earliest known representations of prehistoric man show that the body was covered by a more considerable amount of hair than latterly. Coarse, stiff, bristly hair is an almost infallible index of a strong, husky, full-blooded, thick-skinned, athletic make-up, where fine, feminine hair, a fair skin and so-called blue-blood, with a tendency to varix, connote the thin-skinned, anaemic or asthenic type. All abnormalities of the hair imply weak or bad nerves. Loss of hair may connote syphilis (alopecia), hyperfunction of the thyroid (e.g., in pregnancy), phthisis or senility. The hairy skin of the virago (virilism) is an index of adrenal assertion and a scanty beard or moustache in male or female (*Altweiberbart*) implies weak or defective gonads. Hair prematurely gray is usually an effect of nervous shock or of the impact of environment upon an unstable nervous system. Red hair labors under the imputation of disagreeable aggression and duplicity in gaining selfish ends. People of the lymphatic or heifer-like temperament, with red or blonde hair, smooth white skin, freckles and blue eyes, are liable to tuberculosis (Hippocrates). Albinoes are prone to eczema. Dark (brunette) people are normally intensive and self-centred to the point of fanaticism in pressing a point and holding their own, securely sexed, better adapted to environment, to the tropics and to the impact of tuberculosis than blondes, who are more spontaneous and inconsistent, hence more liable to get into scrapes, through the restless, roving propensities of the Nordic (Havelock Ellis). The skin darkens in pregnancy. The signs of the choleric or apoplectic temperament are a sawed-off, chunky physique, a short wide chest, a full habit of body and a red face; while unduly bright eyes, a thin skin, with tendency to goose-flesh, profuse perspiration, tremor or even hæmophilia, indicate the labile, excitable, nervous and timorous natures. Degree of fatness, common to the pycnic or manic-depressive types, is regarded by Hoesslin as "a footrule of the constitution."<sup>17</sup> Furneaux

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<sup>17</sup>Hoesslin: *München. med. Wochenschr.*, 1921, LXVIII, 797; 912.

Jordan regarded a vaulted back and a smooth, hairless face as an index of the male or female shrew, while the skin of the amiable, upstanding people, "courteous-eyed, erect and slim", has a certain amount of hair, down or *duvet*<sup>18</sup>. Hypothyroids and hypogenital types have a coarse, dry skin with defective perspiration, usually a sign of psychic instability. Hyperthyroids have continual perspiration and cold extremities. The German word for scabies is *Räude* or rough skin. Wheals on the body go with bronchial asthma and œdema. Extreme susceptibility to chemicals is regarded as a sign of the exudative diathesis, which is further liable to seborrhœa of the scalp, prurigo, pruritus, intertrigo and glandular enlargements. The dartrous diathesis of the French dermatologists connotes a tendency to herpes and eczema. In a lecture of 1832, Dr. Richard Bright outlined, as follows, the facial indices of the commoner internal disorders, whereby, in the old English idiom, the patient stands "in a bad skin":

"By the eye you will learn much; many diseases have the most distinct physiognomy. The sunk and shrivelled features derived from the long-continued disease of the abdominal viscera, the white and bloated countenance often attendant on changes in the functions or structure of the kidney, the sallow and puffy cheeks of the liver diseased from habitual intemperance, the squalid and mottled complexion of the cachexia dependent upon the united effects of mercury and syphilis, the pallid face of hæmorrhage, the waxen lassitude of fever, the purple cheek of pneumonia, the bright flush of phthisis, the contracted features and corrugated brow of tetanus—all these shades of countenance and very many more which I might enumerate, with all their varieties of combination, are distinctly recognized by the experienced eye."

To "read the skin", with regard to the elaborate, colored illustrations in atlases of skin disease, is more the province of the professional dermatologist than of the clinician; but, in the light of recent knowledge, it is probable that even some of these readings may not be so simple as formerly. Like all external aspects of disease as altered physiology, they have been, in the convenient phrase of Pater, "liable from the first to an unobserved transformation."

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<sup>18</sup>Jordan: Anatomy and physiology in character. London, 1886.